May 17: Meeting Update

Simulation Settings

- Data generated from two proportional hazards models:
- Simulation Settings

  The cause-specific hazards of the outcome of interest and the competing risk follow proportional hazards models, specifically:

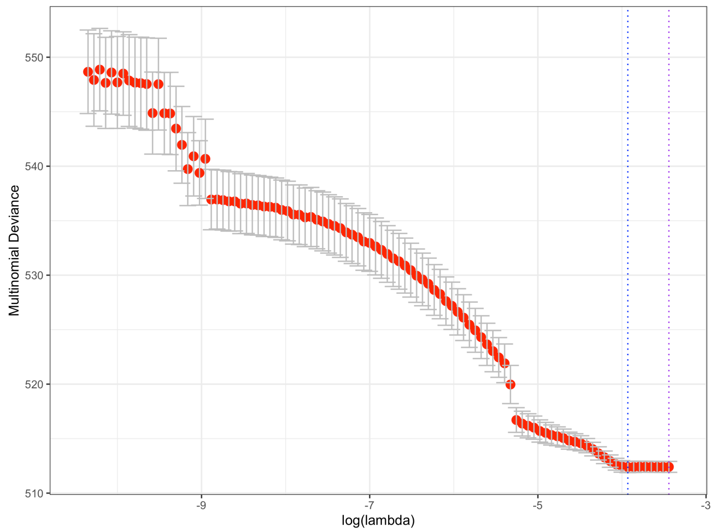
  $$\alpha_{01} = 0.5t \, \exp(\beta_{01} Z)$$

  $$\alpha_{02} = t \, \exp(\beta_{02} Z)$$

  where both cause-specific hazards have the form of a Weibull distribution and a common set of covariates.
- Cause 1 is the one of interest. Censoring times were generated from a $U[0, 6]$ distribution. This leads to $\sim 25\%$ censorings, 55% of the cause of interest and 20% for the competing cause.
- There are two covariate generation settings: IID and with an AR(1) correlation setting with $\rho = 0.5$.
- Extreme sparsity: 1000 covariates were generated with only 16 non-zero covariates

Optimizing lambda value

Log Lambda path against Multinomial Deviance



- Plot doesn't curve up again, quite flat maybe sparsity of simulation?
- Lambda min is quite close to lambda max
- All folds don't reach zero at lambda max?

```
$non_zero_coefs
             [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
3.2e-05      2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
3.43126e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
3.67922e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
3.94511e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
4.23021e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
4.53592e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
4.86372e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
5.2152e-05   2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
5.59209e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
5.99622e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
6.42955e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
6.89419e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
7.39242e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
7.92664e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
8.49948e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
```

```
9.11371e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
9.77234e-05  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001047856 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001123581 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001204779 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001291846 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001385204 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001485308 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001592648 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001707744 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0001831158 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.000196349  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
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0.0002257537 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
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0.0002595619 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0002783197 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0002984331 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.00032      2002 2002 2002 2002 2002 2001 2002 2002 2002  2002
0.0003431255 2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0003679222 2002 2002 2002 2002 2002 2001 2002 2002 2002  2002
0.000394511  2002 2002 2002 2002 2002 2002 2002 2002 2002  2002
0.0004230212 2002 2002 2002 2002 2002 2001 2002 2002 2002  2002
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0.0004863715 2002 2002 2002 2002 2002 2002 2002 2002 2002  2001
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0.0005592091 2002 2002 2001 2002 2002 2001 2002 2002 2002  2002
0.0005996216 2002 2000 2002 2002 2002 2002 2002 2002 2002  2001
0.0006429546 2000 2000 2000 2002 2001 2002 2002 2001 2002  2002
0.0006894191 2002 2001 2002 2002 2002 2002 2002 2002 2002  2001
0.0007392415 2002 2002 2002 2002 2000 2002 2001 2002 2001  2001
0.0007926644 2002 2001 2001 1999 2002 2001 2000 2002 2002  2002
0.0008499481 2001 2002 2001 1999 2002 2002 2001 2000 2002  2000
0.0009113715 2001 2000 2001 2002 2001 2001 2000 2001 2001  2001
0.0009772338 2000 1999 2000 1999 2002 2001 2000 2001 2001  2000
0.0010478557 2000 2002 2000 2000 1999 1999 1998 1995 2001  2001
0.0011235814 2001 2001 1997 1999 1998 2000 1997 2001 1997  1998
0.0012047795 1999 1999 1995 1998 2001 1999 1994 1996 1996  1996
0.0012918455 1999 2000 1999 1996 1999 1998 1993 1999 2000  1995
0.0013852036 1999 1995 1988 1991 2001 1999 1994 1998 1999  1999
0.0014853084 1996 1994 1994 1997 1994 1994 1993 1988 1994  1996
0.0015926475 1993 1993 1997 1991 1994 1986 1992 1995 1995  1997
```

0.0017077438	1991	1993	1989	1991	1996	1990	1989	1988	1996	1994
0.0018311577	1987	1996	1988	1988	1990	1987	1990	1995	1990	1992
0.0019634903	1970	1990	1986	1993	1981	1984	1985	1989	1986	1979
0.0021053863	1976	1975	1976	1982	1985	1976	1990	1974	1982	1987
0.0022575367	1972	1966	1963	1959	1968	1973	1969	1965	1979	1974
0.0024206826	1970	1959	1965	1974	1959	1939	1960	1959	1967	1972
0.0025956187	1959	1937	1946	1967	1960	1962	1965	1952	1952	1954
0.0027831968	1936	1947	1960	1954	1956	1938	1964	1957	1956	1946
0.0029843307	1946	1948	1936	1931	1939	1913	1881	1939	1949	1924
0.0032	1916	1899	1899	1921	1876	1872	1911	1902	1925	1924
0.0034312551	1909	1906	1877	1942	1889	1905	1809	1878	1918	1902
0.0036792224	1823	1894	1884	1800	1865	1829	1838	1889	1866	1869
0.0039451096	1837	1872	1819	1841	1858	1832	1743	1830	1852	1776
0.0042302117	1820	1821	1671	1773	1839	1753	1681	1714	1851	1837
0.0045359173	1715	1551	1772	1787	1732	1750	1697	1730	1757	1770
0.0048637155	1716	1504	1943	1751	1557	1631	1950	1916	1943	1627
0.0052152027	1921	1952	1933	1929	1949	1949	1908	1922	1925	1923
0.0055920909	1912	1932	1887	1945	1906	1924	1872	1918	1940	1881
0.0059962158	1928	1940	1927	1903	1891	1932	1902	1875	1891	1882
0.0064295456	1914	1827	1883	1883	1857	1885	1870	1844	1827	1880
0.006894191	1651	1794	1884	1835	1857	1792	1839	1899	1877	1733
0.007392415	1732	1782	1733	1607	1825	1737	1725	1829	1753	1695
0.0079266443	1697	1875	1694	1777	1543	1774	1772	1730	1820	1554
0.0084994809	1781	1701	1667	1764	1517	1379	1627	1652	1475	1758
0.0091137148	1530	1639	1279	1428	1369	1607	1349	1709	1125	1631
0.0097723376	1422	1473	1570	1192	1304	1610	1193	973	1066	1258
0.0104785573	1581	1557	1516	1601	1639	1143	1056	1406	1480	1498
0.0112358135	1475	910	1438	1453	1378	922	712	1112	1261	1088
0.0120477946	579	706	734	1210	865	829	919	614	1387	1010
0.0129184552	1379	948	1070	621	1049	804	670	523	1028	1004
0.0138520361	720	575	617	833	539	662	651	423	1066	579
0.0148530843	354	551	399	425	341	298	571	236	724	674
0.0159264754	202	341	513	419	311	285	202	164	263	574
0.0170774375	369	145	133	117	280	123	163	144	350	235
0.0183115765	129	136	535	109	109	357	157	188	358	350
0.0196349033	86	45	479	381	50	146	61	338	184	475
0.0210538632	56	36	58	686	55	167	69	49	58	47
0.0225753674	25	33	139	101	29	22	32	30	39	291
0.0242068265	79	15	23	23	53	313	117	29	12	185
0.0259561866	26	8	22	22	22	12	4	11	47	19
0.0278319681	18	9	11	8	14	18	5	34	25	7
0.0298433071	70	4	8	13	4	14	5	5	5	11

```
0.032              4     5     4     4     8     5     4     4     4      4
```

Lambda 1se and 0.5se in other direction

- Got confused with calculation: calculated `lambda.min 0.5se` as such but `lambda.min` is the minimum, code has been changed now

```
dev.0.5se <- mean_dev[which.min(mean_dev)] + cv_se/2
```

New code:

- `lambda.1se` - largest lambda value that is within 1SE
- `lambda.0.5se` - largest lambda value that is within 1SE/2
- `lambda.min1se` - smallest lambda value that is within 1SE
- `lambda.min1se` - smallest lambda value that is within 1SE/2

```
mean_dev <- rowMeans(all_deviances)
    lambda.min <- lambdagrid[which.min(mean_dev)]
    cv_se <- sqrt(var(mean_dev)/nfold)
    dev.1se <- mean_dev[which.min(mean_dev)] + cv_se
    dev.0.5se <- mean_dev[which.min(mean_dev)] + cv_se/2
    range.1se <- lambdagrid[which(mean_dev <= dev.1se)]
    lambda.1se <- tail(range.1se, n = 1)
    lambda.min1se <- range.1se[1]
    range.0.5se <- lambdagrid[which((mean_dev <= dev.0.5se))]
    lambda.0.5se <- tail(range.0.5se, n = 1)
    lambda.min0.5se <- range.0.5se[1]
```

Results for N = 400, p = 1000 (p > N) (Number of Simulations = 10)

Next Steps

- Compare `casebase`, `Fine-Gray` and `Binomial models` in terms of CIF prediction error and Brier score. These results will be generated for next week's meeting
- Re-create Austin et al., result for Casebase